

Hughes El Segundo Employees Association  
Atari Computer Enthusiasts  
Reprints of Exchange Newsletter Articles  
May 1989 Richard L. Reaser

	Title of Article	Author's Last Name	Author's First Name	Newsletter	Issue Date	Remarks
2	4 MEG Barrier, Thoughts on Breaking	Zachary	Mike	CPAUGS	04/00/89	Hardware project
5	Atari's Back	Gram-Reefer	Bill	Microtimes	04/00/89	News
8	Cray on a Chip, Intel's	Hayes	Frank	BYTE	05/00/89	80860 RISC microprocessor
10	Digital Diary by Casio	Editor	Editor	WSJ	04/00/89	64K with computer interface
11	<del>Maynard</del> IMPURE MATU	<del>PARKS</del> MAYNARD	Ray	AVACE	04/00/89	Cute story
12	Menu Program	Parks	Paul O.	NWPAC	03/00/89	Take apart of prorgam
16	PD Software, The Best of 1988-Part4	Terpening	George	PSAN	04/00/89	List with descriptions
17	SC1224 Color Output Improvement	Gratzer	Rich	PSAN	04/00/89	Hardware project
18	ST Drive Switch	Pike	Bill	CPAUG	04/00/89	Hardware project
21	ST Hard Drive Mod to change start up	Landon	Larry	PSAN	04/00/89	Hardware project
22	Tweety Board	Thorson	Dave	NWPAC	03/00/89	Sound outputs for STs
23	PEPPER & SWEET HUMOR					



# THOUGHTS ON BREAKING THE 4-MEG BARRIER

## PART 2

CRAIGS 4-84

2

by Mike Zachary, NWPAC

First off, I would like to apologize for the lateness of this article. Things have been real busy, this article was more difficult than I expected, and I had some trouble with my mouse.

Last time, we looked at some of the difficulties involved in expanding the ST's RAM beyond 4 Meg. This time I'd like to talk about some steps toward a couple of possible solutions. I haven't put all the pieces together ; in fact, further examination of the information available to me has uncovered some additional problems that I didn't know about when I wrote the first article. I'll have more to say on that later in this article. I would like to present what I DO have, however, because somebody else may have the missing pieces of the puzzle, and because some of the material could have other applications as well.

To begin, if we want the added RAM to be accessible to MMU to allow DMA and video access and to let MMU do the refresh, we must make the RAM LOOK like 4 Meg to MMU. At this point, all the 8-bit people are saying 'bank switching', and that is indeed what we will have to do, but bank switching is kind of a pain when the software has to do the switching, especially if several different methods of dividing up the banks and handling the switching arise. Is there some way that we can make the RAM look like more than 4 Meg to the user ( in computerese, can we make the bank switching user-transparent ) ? Refer to Figure 1.

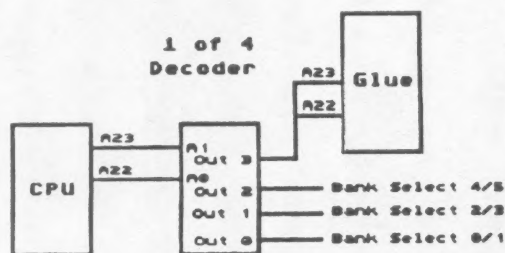


Figure 1

A22 and A23 are the top 2 address lines ( the ones that MMU doesn't have ). You would have to cut these two lines between the CPU and Glue, and tie them together at Glue ( this is one possible source of trouble - I don't THINK Glue generates addresses on the address lines, but if it does, this would at the very least prevent the machine from working, and could possibly damage Glue ). The two lines from the CPU are connected to a 1 of 4 decoder. For those of you who are not familiar with digital electronics, a decoder turns on one of it's output lines that corresponds to the binary value of it's inputs.

On the diagram, the line connected to A22 and A23 on Glue is only high when there is a binary 3 ( both lines high ) on the inputs, so A22 and A23 on Glue will be high when A22 and A23 on the CPU are high. This is necessary to allow access to the ROMs and the peripheral chips. The lines to Glue will be low at all other times, so Glue will 'think' that the RAM area is to be accessed. This gives us 12 Meg of RAM. You could free up some in the top 4 Meg with more complex circuitry. The three lines marked 'bank select' coming off the decoder correspond to the other 3 possible binary values of the inputs. The bank switching could be preformed by these lines in a couple of different ways. The easiest way would be to control the CAS ( column address strobe ) lines to the banks of RAM chips. Incidentally, the address, data, and RAS lines of the added banks would simply be paralleled with the corresponding lines in the existing banks.

There is one possible problem with switching the CAS lines, however. It will work if MMU generates the addresses for refresh, but if MMU uses the automatic refresh built into the chips, switching the CAS lines would prevent the unselected banks from being refreshed. The other solution is to switch the data lines ( in which case the CAS lines would be paralleled ). This requires more circuitry, but would definitely work. Now, if all RAM access was through the CPU, the circuit of figure 1 would

work fine, but all RAM access is NOT through the CPU, and we need to take that into account. As a matter of fact, the circuit of figure 1 would totally PREVENT RAM access for DMA. Recall that the CPU relinquishes control of the busses for DMA. That leaves the address lines open ( assuming Glue does not generate addresses ), and there are 'pull up' resistors on the address lines that make them high when no signal is present. This would deselect all banks of RAM. For the solution to this problem, see figure 2.

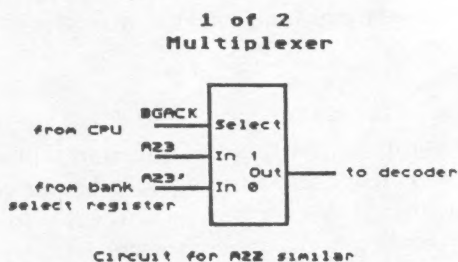


Figure 2

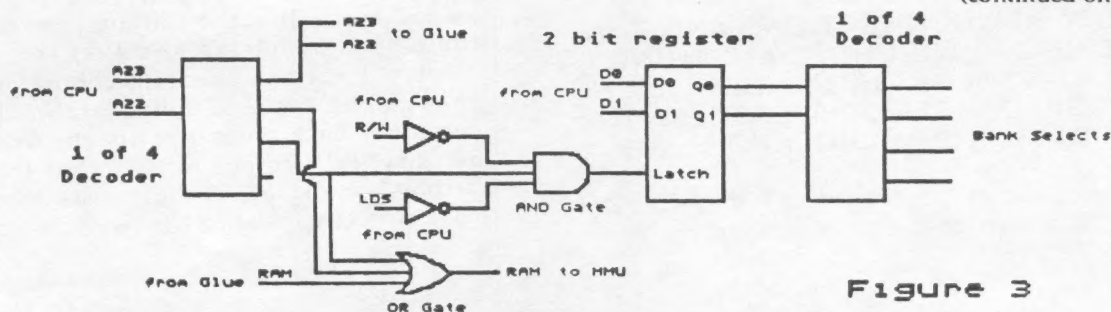
This circuit goes between the CPU and the decoder in figure 1, and only half the circuit is shown, the connections for A22 being similar. This is a 1 of 2 multiplexer ( a device that allows you to select one of several inputs to appear at it's output ), controlled by BGACK ( bus grant acknowledge ). BGACK is low when the CPU has relinquished the busses. When BGACK is high, the address lines are connected to the multiplexers. When BGACK is low, a bank select register is connected. This bank select register could be loaded from the data lines D6 and D7 when memory location FF8609 ( high byte of the DMA counter ) is written to. This would mean that you could not do DMA across a 4 Meg boundary without reloading the DMA counter, but that can probably be lived with.

Unfortunately, there is still 1 other type of RAM access that we haven't dealt with yet - the video. I originally thought that the video access was handled as DMA, but closer examination of the schematics revealed that this is not the case, as the logic probe reading shown for BGACK is high, and it would have to be pulsed if DMA were involved in the video access. Further examination revealed that the data lines on the RAM chips are isolated from the data bus by buffers, and shifter's data lines are connected UPSTREAM of the buffers. So it appears that shifter does it's access between normal RAM accesses. Without any information about the timing, it would be extremely difficult to try to make it work by trial and error. So I am stymied in this direction.

So looking at regular bank switching, the first question is where to put the switchable memory. The bottom portion of RAM is reserved by the CPU for exception vectors ( if you don't know what they are, don't worry about it - just realize that you can't be switching them in and out ), and the top part is where the video RAM is set up. The best place would probably be the 1 Meg area from 200000 to 2FFFFFF, but that splits a bank in half and would make the circuitry more complex. My personal choice would be to use the entire upper bank ( 200000 to 3FFFFFF ) and move the video RAM into the lower bank when using the extra RAM ( just blanking the screen during access to the extra RAM would work if it is accessed only occasionally for short periods of time, as with a RAMdisk ).

The only question that remains is where to put the bank select register. See figure 3 for the solution. The bank select register appears in the 4 Meg area above the RAM. With additional decoding of the lower address lines, you could have other registers, peripheral

(continued on page 16)





(continued from page 6)

chips, or even ROM or static RAM in this area.

The AND gate serves to generate the signal to load the register. The output of an AND gate is high if and only if all of it's inputs are high. LDS is the strobe for the lower ( odd ) bytes of the memory words, and R/W is the read/write select line. Both these are active low, so we must run them through inverters.

The OR gate prevents RAM from being accessed when the bank select register is loaded ( remember that Glue 'thinks' the bottom 4 Meg is being accessed except when both A22 and A23 are high. This is necessary to prevent a bus error when writing to the bank select register ). The output of an OR gate is high whenever one or more of it's inputs are high. The RAM select signal is active low, so it is effectively blocked when either of the lines going to the OR gate from the decoder is active.

The bank select decoder is shown with 2 inputs and 4 outputs, but could have considerably more ( with a larger latch as well ). An 8-bit latch with the appropriate decoding circuitry could bank switch 512 Meg of RAM ( with 2 Meg banks ), and a 16 bit latch/decoder... let's not get carried away here.

Anyway, that's what I have. Even if none of this is ever built, I hope you all have learned something about your ST.

(continued from page 8)

so check all circuits for continuity. Making sure that I didn't get continuity through two lines at one point. Some of the needed material could have been picked up at Radio Shack, but when I asked for an Atari Joystick extender cable and the clerk said they "only carry stuff for real computers", I calmly explained that the Atari is a real computer and walked out.

TABLE 3 did not tell me what to do with the GRAY cable, so I just twirled it around a post inside the case and left it at that. Evidently, it is not needed.

D. E. Wenzelburger and R. K. Deen make no guarantees that this modification will work for you. You are responsible and liable for your own actions. However, if you carefully follow the above directions, are competent with electronics, and use common sense you should have no problems making this modification.

Remember though that by making this modification you may be voiding your warranty on the trakball. I was able to complete the project in under two hours. Take your time and Good Luck!

(continued from page 15)

thru the open holes, that you removed the pins from. Take the other pair of wires and solder them directly on the pins of the chip. Turn the board over and solder the wires that you poked thru the holes. Neaten up the wires.

VERIFY ALL CONNECTIONS AND THAT NOTHING IS TOUCHING ANYTHING IT SHOULDN'T BE ALSO THAT THERE ARE NO SOLDER BRIDGES OR SPLASHES. THIS COMPLETES THE MODIFICATION.

#15, Repeat steps #7 thru #1 IN REVERSE ORDER to reassemble the computer.

#16, Connect the external drive to the computer and also connect the power and monitor. If the computer fails either of the next tests something is wrong, shut the computer down and re-check what you did. Turn the computer on and verify that the activity light on one of the drives comes on and that the screen display is normal. Turn the computer off and change the drive select switch. Turn the computer back on and verify the other drive activity light comes on and that the screen display is normal. If these tests are OK you have correctly installed the switch.

# Atari's Back!

By Bill Gram-Reefer

1988 wasn't the best of years for Atari. The DRAM crunch hit the company hard, and many of its resources were strained by the company's acquisition of the failing Federated consumer electronics retail chain.

That was then, this is now. Unburdened by Federated, and with the DRAM situation under control, Atari announced a number of new products at Spring COMDEX, perhaps most notably the hand-held Portfolio portable, an XT compatible with an attractive \$399 price tag in keeping with Atari's long-time obsession with rock-bottom pricing and mass markets.

The company has also announced an aggressive promotional campaign, including TV ads featuring sound by Moody Blues founder Michael Pindar and stressing Atari's new Mega-based desktop publishing system.

Bill Gram-Reefer of *MicroTimes* recently visited Atari's Sunnyvale headquarters and found an upbeat atmosphere. He spoke with sales vp Michael R. Dendo and marketing vp for desktop publishing Joe Mendolia. They explained that the media campaign is part of their overall strategy to "pull out all the stops" in an aggressive campaign designed to re-establish Atari Computer as a major player in the US market.

**Joe Mendolia:** As you're probably aware, Atari has not been extremely active the past few years in the US marketplace.

There was a time-frame in which the company was very active in the US marketplace. Some things, you could say, may have got a little bit out of control during that time. Some people view it that way, some don't. However, when the company came up against the DRAM shortage, there had to be a decision. There was not enough DRAM to grow both the US and international European markets or the corporation.

The company had to make a critical decision at that point, whether to spread product across both places and basically hold position, or whether to focus the product in one area and become a leading product in that area. The decision that the corporation made at that time was to focus on Europe—and to come back to the US after that was achieved and after the DRAM shortage had passed, which

we feel that we're past at this point. Our DRAM availability is much larger than it was.

What happened, though, in the interim, is that that gave the US corporation a chance to clean up the US [distribution] channel and to apply a new segmentation philosophy that doesn't just allow any product to any dealer at any level.

We have different products that work in different marketplaces. At the moment, business computer dealers are our top-level dealers, and are the only people that are able to handle our Mega line. Below that we have something called computer specialty dealers, which are also computer dealers but not with the same level of support and service capabilities. Those people are able to carry, for instance, 520/1040 line, but they can't carry the Mega line.

We have a thought process on our entire line, even the new products we're about to bring to market, as to how the segmentation works. And we will apply that segmentation to the marketplace to try to keep the channels clear, and try to keep it so that the consumer not only gets his best value from shopping, but also can get the necessary support and service for the type of product he's buying.

Consumers feel like they "win big," sometimes, when they buy a high-level product at a very low cost, for instance through a mail order. That's until something goes wrong with that product. Then the consumer feels like he just got it. Somebody got him somewhere along the line here. As we all know, different products require different levels of service, different levels of support. And we're trying to segment our channels and the capabilities of our dealers and distribution channels so they fit the product.

**Michael Dendo:** I think that a good point that Joe is bringing up is that now that our DRAM problem is gone, the corporation has met the commitment that Sam [Tramiel, Atari's president] made last November at COMDEX. He said that he would go out, make advance DRAM buys, and he was going to provide the product and the dollars to rebuild the marketplace. Sam's met his commitment.

And on top of that, the company hasn't taken, if you will, the straight line approach, the easy approach to get a whole bunch of numbers real quickly. Our product line

could be very salable in other channels of distribution.

**For instance?**

**MD:** Mail order, as Joe said. We've already proven that we have a hot mail order product. That's why mail order was discontinued, because it hurt the dealers.

Mail order, by definition, doesn't require the same number of margin points to work as a dealer with a storefront, maybe paying certain points to the principals of a mall-store, with a service department. The cost of doing business for a retail dealer is just higher than it is for mail order.

**What about mass merchandising channels?**

**MD:** Well, mass merchandising channels were a methodology that the company utilized. I think some things, i.e., Federated, caused the outside marketplace to be a little bit hesitant to pick up an Atari product and then have to compete against an Atari-owned retailer, particularly in the West.

On top of it, prices on MS-DOS 8088 shrank and shrank and shrank to the point that most of your mass merchandisers carried MS-DOS. We believe that with some of our newer product coming out in the marketplace, that mass merchandising is definitely a channel of distribution that we may opt for.

**JM:** On certain products.

**That's going to depend on the kind of technology and product, though?**

**JM:** Absolutely. The computer group, in the past, has used some product in mass merchandise. And at this point we have some new products coming out which we think will work well in mass merchandise from the computer division. For instance, Portfolio.

**MD:** From Joe's and my perspective, the key to our business and continued growth and success is al-

ternative channels of distribution. In the future one of the great things that our new products will do for us is that we're now going to have the opportunity to broaden our channels of distribution, to entertain the higher quality mass merchants, to entertain key accounts.

[It isn't that] Atari Computers is not in key accounts because they all said, "We don't want your product." Atari Computers is not in key accounts because we didn't feel we were ready with product, pricing or administration to go in and support those people.

**Tell us about the importance of the dealer channels, particularly the Business Computer Center dealers, and in what ways you're going to support them. Is there any fence mending going on here in light of the Federated adventure?**

**JM:** Let me address the Federated thing and get it out of the way. Federated was a subsidiary of Atari. Plain and simple. It was not part of Atari Computer, it was not part of Atari Entertainment, it was not part of Atari Consumer Products. It was Atari Retail.

The different subsidiaries are independent and run as independent businesses. So the impact of having Federated or not having Federated to the computer division is only a question of "Did we have them as a dealership? Will they continue as a dealership under whatever they end up being?"

Federated, to us, was just another available channel. We had to sell into that channel as we had to sell into any other channel. Just because it was wholly owned by Atari does not mean we could walk in and take the business. They purchased under the same conditions as any other dealer.

**Do you see a crossover between the music retailer and the office equipment channel and traditional computer resale channels?**

**MD:** As you know, we are the number one computer for MIDI. As a matter of fact, we have a gentleman who just won an Academy Award using our computer to do his whole production. We look at that as a market that we want to be real greedy about. We're at 30-some percent now and we could have all of it; we want to have all of it.

**JM:** We also have new products coming out for that channel. We have a new computerized keyboard that is a new instrument. It's not a keyboard as people have thought of keyboards in the past. It knows how hard you're hitting the keys. On a standard keyboard when you hit a key, you hit a key on an electronic keyboard. This

one is velocity sensitive so it knows. It has no moving keys, they're pads.

But it can also take in information from CDs and such, so the keyboard is always playing in the same key as the music from the CD or other keyboards around it. It can sample the information and lock you in so that the first time through, there are no mistakes in the key or what you're playing. It's a completely new technology for MIDI.

**MD:** Its unique selling proposition is very simple. You can take someone who doesn't know anything about playing a musical instrument, and they can have the instant gratification of playing an instrument. That's the key: to not have to be musically talented or know how to play an instrument to play this device. Not to use a cliché, but for anybody of all ages, you can now play an instrument. That's very unique.



As the XT technology runs out of steam and there are no more innovations there, the price will plummet as those products increasingly find their way into the mass merchandising channel. On the other hand, the Intel 386-486 technology and Apple's redirection toward high-end support, high-margin product are creating a focus on serving customers at the corporate level. Is this an opportunity, then, for Atari to own the the middle ground?

**MD:** We look at what Apple has done, which is [that it] basically abandoned that arena, going after corporate America. Abandoning the majority of the dealers by virtue of quotas and everything else. And it is a unique opportunity.

**JM:** Companies are forgetting the individual. They're forgetting the individual and the individual's needs. And that's an area we're going to focus on.

**MD:** We're going to strengthen the retail marketplace just by definition of product line. However, there is product, which is going to be available in a very short period of time, six months or less, that is not retail oriented. So our new product lines are going to broaden our distribution capability.

We feel very strongly that, with the gains we are making in desktop publishing and with our new products, you will see our ability to broaden our distribution channel.

**JM:** This year is a growth year for Atari Computer in the US. Some people say a renaissance for Atari. We're determined as a corporation, and we have enough corporation at this point, to become a major player in the US market from the bottom to the top.

You're quoted as saying Atari will "pull out all the stops." What does that include?

**JM:** Our advertising campaign, our new products, our new dealer programs that we put into place for this quarter; our growth of support personnel internally to support the dealers and consumers; the fact that we have prioritized the US for product so if we need product in the US, it will be here. We will not be short of product to deliver in the United States as the company has been in the past—that's what I'm talking about with "pulling out all the stops."

We're going to attack it on every front we can as a company. And unlike other companies that may be trying to get into the US, that are fairly constrained at the moment, we have the corporate resources to bring that focus back here. We're not an upstart. We have enough other divisions to support what's necessary to make this division successful. And we're putting the right people in place. We're putting the management staff in place that has done it before in this industry.

**With Apple competing with DOS in the corporate market, how do you plan to make inroads against those two dominant standards and establish Atari at that level?**

**MD:** There are two issues with regard to distribution. Number one, the Portfolio product, that says Atari on it, will be in the hand of an executive who works at Procter and Gamble, [another] who works at Shell Oil. We're going to have instant credibility as a computer corporation

8

# Intel's Cray-on-a-Chip

Designed as a microprocessor version of the Cray 1, Intel's new high-speed 80860 RISC microprocessor sports an on-chip FPU and a 3-D graphics processor

it was a one-chip version of the Cray supercomputer.

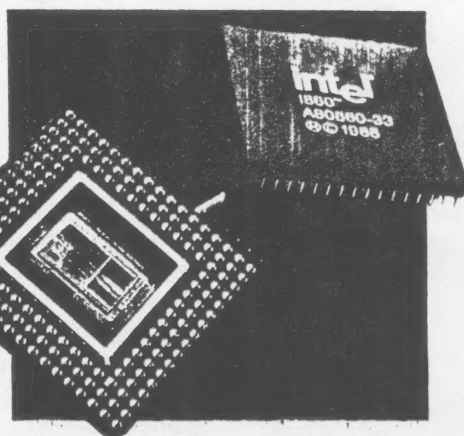
Two weeks later, Intel officially announced the chip and dubbed it the Intel 80860. The new chip would be expensive, to be sure, but it wouldn't cost much more than a high-speed numeric coprocessor. Although the chip's RISC architecture prevents it from being 8088 compatible, it could become extremely popular nonetheless. When it becomes available next month, the 80860 should have a significant impact on graphics- and Unix-based systems.

When I set out to write this First Impression, I had three questions in mind. Exactly how good is the 80860? Is it really a Cray-on-a-chip? And if it's really that fast, how did it get that way?

## YARP?

In some ways, you might tend to dismiss the 80860 as YARP—yet another RISC processor. Several other RISC processors are already available. One of the most popular is the SPARC chip set, which is used in the Sun-4 workstation line and the new Sun SPARCStation 1 (see page 108). Running second in popularity is the MIPS processor, which is the CPU for the Silicon Graphics Personal IRIS workstation (see "Silicon Graphics Brings Down Cost of 3-D Graphics," Microbytes, November 1988, page 16). A third contender, Motorola's 88000, is just beginning to appear in workstations from Opus, Everex, and Data General. A fourth is IBM's own RISC CPU, the processor used in IBM's RT PC. The RISC processor market has become so crowded, in fact, that one chip maker, AMD, has decided to pull its RISC chip, the 29000, out of the competition.

But the 80860 is special in several ways. First, while its more established competitors are actually chip sets, the 80860 is a single chip. The SPARC, for example, uses separate chips for integer



math, floating-point math, memory management, and other functions, typically five chips in all. The 88000 improves on that; it has all the math functions on one chip and requires only two extra chips for instruction and data caches. By contrast, Intel designed the 80860 with a million transistors, which allowed the designers to fit everything, including the memory caches, on a single chip. Among other things, this means that the 80860 will take up less space on printed circuit boards or add-in cards, and it should use less power.

But there's another advantage to having everything on a single chip: speed. RISC processors, after all, are purposely designed to run fast. Their instruction sets have been pared down to a bare minimum of simple instructions that can each be performed in a single clock cycle. In the case of very fast processors, however, when memory is on one chip and the processor is on a separate one, the transfer of information from one chip to another cannot keep up with the CPU's internal speed. Faster RAM helps, but there is still a natural speed limit to how fast you can move data around on a printed circuit board. And when you are trying to save

*continued*

Last fall, speculation was running rampant about Intel's forthcoming 80486 microprocessor. Rumors circulated that it was a veritable mainframe-on-a-chip—a CPU so powerful that it could serve as the heart of the entire computer industry, from desktop microcomputers to supercomputers. Now it appears that some of those rumors weren't about the 80486 after all, but about another new chip from Intel, the 80860.

The 80860, Intel's first full-scale RISC processor, made its initial appearance in February at the IEEE's International Solid-State Circuits Conference in New York City. Known then only by its code name, "N-10," the chip appeared to be the highlight of the show. Intel's designers described their brainchild as a 64-bit processor containing 1 million transistors. It could run at up to at 50 MHz and could perform at a rate of 105,000 Dhrystones per second—about 13 times faster than the fastest 80386-based system. Moreover, the 80860 included an on-chip FPU that was capable of performing 17 million floating-point operations per second (MFLOPS) and a three-dimensional graphics processor. The designers of the 80860 claimed that



nanoseconds, even the small distances between chips can seem like light-years.

With everything on a single chip, the 80860 sidesteps many of these delays. Once data or instructions are read into the cache through the 64-bit-wide bus, they move around the chip internally on pathways as wide as 128 bits—and at transfer rates that are reportedly more than a billion bits per second. The caches are big enough (4K bytes for instructions, 8K bytes for data) that reasonably large loops (those that have up to 1000 instructions) will fit completely into the cache.

#### Parallel Processing and Pipelines

Another very sizable part of the 80860's speed comes from its parallel design. The new chip is designed to do three things at once: integer math, floating-point addition, and floating-point multiplication. This is possible because the chip's three math units are separate and can work on different problems at the same time.

In addition, each of the three math units is designed for pipelining. In most CPUs, each math instruction actually consists of a series of smaller, simpler operations. When most CPUs receive an instruction, they take a piece of data and perform each of these smaller operations separately on the data until the instruction is finished. The CPU then begins work on the next instruction and the next piece of data. By contrast, a pipelined system such as the 80860 is like an assembly line, with each of the smaller operations lined up in sequence on the production line.

As soon as the the first piece of data has completed the first stage of the assembly line, the CPU can start work on the second instruction and the second piece of data. Thus, even though an instruction may take dozens of clock cycles to complete, the 80860 can still produce one new result every clock cycle—from each of the math units. That means that, at 40 MHz, the 80860 can theoretically produce as many as 120 million results per second.

One problem with pipelining is that it requires that the CPU perform exactly the same operation on the data each time the pipeline is used. In other words, you cannot retool the assembly line. Another problem involves memory. Pipelining works effectively only when there is data in the data cache. This cache feeds the assembly line at much higher speeds than regular memory can.

The 80860's floating-point adder and multiplier can also be linked together for

vector operations. Indeed, Intel's designers say the 80860 is specifically modeled after Cray's vector-processing supercomputers. The company also claims that many of the vectorizing programming tools that were originally designed for the Cray will also be able to optimize 80860 software, but because the 80860 isn't limited to a vector register architecture, it is reportedly easier to program.

#### Graphics: Z-Buffers and Shading

To give the 80860 even more power, Intel filled one small hole in the chip with spe-

**BM and  
Intel have already  
shown an 80860 on  
a PS/2 graphics card  
that can probably  
run rings around most  
other workstations.**

cial three-dimensional graphics hardware. This feature takes up only about one-thirtieth of the chip's area, but it provides special functions like z-buffering and Gouraud and Phong shading. Z-buffers store information on the third dimension of each pixel in an image and allow high-speed three-dimensional imaging.

The on-chip graphics processor makes sense for a chip that wants to do the work of a Cray, since a large proportion of supercomputing consists of graphics rendering. In fact, it is in a graphics coprocessor board that the 80860 will probably first appear as a product. IBM and Intel have already shown a PS/2 Micro Channel bus-master card built around the 80860 that can probably let a Model 80 run rings around most other workstations. Unfortunately, neither IBM nor Intel has indicated when the card will be available as a product.

It is easy to conclude that the chip might be confined to graphics workstations, but one Intel engineer pointed out that the company isn't just interested in the traditional workstation market. "We want to sell a lot of chips—a lot more than Sun sells workstations," he said.

The 80860 will go anywhere Intel can find a niche for it. It is designed to work easily in parallel with other 80860s, with existing 80386s, or with the forthcoming 80486s. It can work either as a coprocessor or as part of a multiprocessing system. That means it could work in the whole range of computer applications, from plug-in personal computer cards to minisupercomputers. Indeed, Intel says a minisupercomputer will be in beta test by the end of this year.

In June, a 33-MHz version of the first 80860 will become available. A 40-MHz version will be out by the end of the year, and the 50-MHz version should arrive in 1990. The 33-MHz version will be available in quantity for about \$750—roughly as expensive as an 8087 math coprocessor was in 1981. And as more 80860s are produced, the price will begin to drop. Within two or three years, the price of an 80860-based workstation should be well below \$10,000.

By then, there should be plenty of software to take advantage of the chip's power. Although the chip cannot directly run DOS or OS/2, it should be a powerful Unix engine. In fact, two separate versions of Unix are currently in the works—one from AT&T (System V release 4, which should be available by the end of the year) and a multiprocessor version from Olivetti. And although the 80860 cannot run OS/2 directly, Intel claims that there are already hooks in OS/2 to use the 80860 as a coprocessor. C, FORTRAN, and Pascal compilers are reportedly already available, along with math libraries for the functions that aren't provided on-chip.

#### Competition with the 80486?

Although Intel might sound as if it wants the new 80860 to become as ubiquitous as its popular 80x86 family, the new chip is not designed to replace the 80486 or its successors. In fact, the company made a point of saying that the 80486 would be officially announced around the time you read this. The two chips share much of the same technology, but the 80860 is the more ambitious of the two, aiming at supercomputing.

The 80860 is clearly a very exciting chip. Whether that will be enough to grab a big share of the graphics, workstation, and supercomputing market remains to be seen. But as it stands, it's the fastest thing on silicon—and the closest anyone's come yet to a Cray-on-a-chip. ■

*Frank Hayes is a BYTE associate news editor based in San Francisco. He can be reached on BIX as "frankhayes."*

WALL STREET  
JOURNAL

4-17-89

(10)



## Meet the Boss that makes your day.

1989- 6-14 (MED)  
8:00a Breakfast Meetings/R. JONES  
9:00a \* New Product Meetings \*  
RE: B.O.S.S. Digital Diary  
11:00a  
2:00p Advertising Meetings

**8:30** Check Your Appointments

123456789012

**3:00** Calculate Your Figures

<XYZ CORPORATION>  
John Smith 201-555-2300  
Vice President Of Marketing  
Calculator Products Department  
P.O. Box 7000  
570 Mount Pleasant Avenue  
SUB CARD

**10:00** Organize Your Client List

ALARM 1989- 6-14 (MED)  
4:30p  
\$\$\$ CALL BROKER \$\$\$  
Put STOP LOSS Order on  
Global Ind. @ 454

**4:30** (Beep, Beep) Call Your Broker

SOME TIME TRFR SR SOME TIME TRFR SR  
6 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31  
7 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

**11:40** Review Your Travel Plans

\*\*\* HOME TIME \*\*\*  
CITY 1989- 6-14 (MED)  
PM 6:30 12

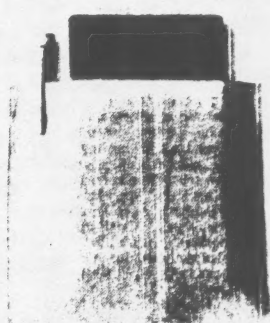
**6:30** End Your Day

\*\* FLIGHT SCHEDULE \*\*  
(New York) (London)  
10:00a (J1165) 12:44p (UA897)  
10:25a (KL248) 1:00p (J1175)  
11:05a (BA077) 1:35p (AF632)  
11:35a (AF302) 2:05p (NW479)

**12:15** Load PC Information

\*\*\* MEMO LIST \*\*\*  
1) Car in for service  
2) Pick-up Suit at Cleaners  
3) Grocery list

**2:00** Write Your Memos



UNIT 239  
INTERCOM 99

## The B.O.S.S. The Business Organizer Scheduling System.

With your busy schedule, you need information fast. That's why we developed the B.O.S.S.™

The B.O.S.S. has everything you need to make your day more organized. It lets you check your schedule. Your business card listings. Your calendar. Or your clients' phone numbers. It lets you calculate figures. Write yourself a note. And check your local time. Even check the current time in 127 cities around the world. All at a touch of a button.

This new Digital Diary™ features 64K memory and an expansive double width screen. It can exchange data with your personal computer and other B.O.S.S. models. Its secret password protects your private data. And its daily alarm reminds you of those appointments you don't want to miss.

Whether it's to organize or plan, the B.O.S.S. has the power to make your day.

**CASIO**  
VOLUME 1000

For more information, call 1(800)553-8335.

Casio, Inc. Calculator Products Division, 570 Mt. Pleasant Avenue, Dover, NJ 07801. Casio Canada Ltd., 2100 Ellesmere Road, Suite 240, Scarborough, Ontario M1H 3B7. B.O.S.S. and Digital Diary are trademarks of Casio Computer Co., Ltd.

# IMPURE MATHEMATICS

source unknown

transcribed by Ray Maynard - AVACE

(Note from Ray: The following anecdote can be interpreted in several ways. However, those who have a mathematics background should find this particularly amusing.)

Once upon a time (1/T) pretty little Polly Nomial was strolling across a field of vectors when she came to the edge of a singularly large matrix.

Now Polly was convergent and her mother had made it an absolute condition that she muse never enter such an array without her brackets on. Polly, however, who had changed her variables that morning and was feeling particularly badly behaved, ignored this condition on the grounds that it was insufficient and made her way in amongst the complex elements.

Rows and columns enveloped here on all sides. Tangents approached her surface. She became tensor and tensor. Quite suddenly, three branches of a hyperbola touched her at a single point. She oscillated violently, lost all sense of directrix and went completely divergent. As she reached a turning point she tripped over a square root which was protruding from the erf and plunged headlong down a steep gradient. When she was differentiated one more she found herself, apparently alone, in a non-euclidian space.

She was being watched however. That smooth operator, Curly Pi, was lurking inner product. As his eyes devoured her curvilinear coordinates, a singular expression crossed his face. Was she still convergent, he wondered. He decided to integrate improperly at once.

Hearing a vulgar fraction behind her, Polly turned round and saw Curly Pi approaching with his power series extrapolated. She could see at once, by his degenerate conic and his dissipative terms that he was bent on no good.

"Eureka", she gasped.

"Ho, ho", he said. "What a symmetric little polynomial you are. I can see that you're bubbling over with secs."

"O sir," she protested, "Keep away from me. I haven't got my brackets on."

"Calm yourself, my dear," said our suave operator. "Your fears are purely imaginary."

"I, i," she thought, "perhaps he's homogeneous then."

"What order are you," the brute demanded.

"Seventeen," replied Polly.

Curly leered. "I suppose you've never been operated on yet," he asked.

"Of course not," Poly cried indignantly. "I'm absolutely convergent."

"Come, come," said Curly. "Let's go off to a decimal place I know and I'll take you to the limit."

"Never," gasped Polly.

"Exchlf," he swore, using the vilest oath he knew. His patience was gone. Cashing her over the coefficient with a log until she was powerless, curly removed her discontinuities. He stared at her significant places and began smoothing her points of inflexion. Poor Polly. All was up. She felt his hand tending to her asymptotic limits. Her convergence would soon be gone forever.

There was no mercy, for Curly was a heavyside operator. He integrated by parts. He integrated by partial fraction. The complex beast even went all the way around and did a contour integration. What an indignity. To be multiply connected on her first integration. Curly went on operating until he was absolutely and completely orthogonal.

When Polly got home that evening, her mother noticed that she had been truncated in several places. But it was too late to differentiate now. As the months went by, Polly increased monotonically. Finally she generated a small but pathological function which left surds all over the place until she was driven to distraction.

The moral of our sad story is this. If you want to keep your expression convergent, never allow them a single degree of freedom.

KIT 'N' CARLYLE

By Larry Wright





**XE  
XL**

# BACK IN THE SADDLE

by Paul O. Parks, NWPAC

*MENU PROGRAM TAKES APART*

3-89

(12)

Howdy. Yup, I'm back in the bit saddle once more but for awhile I'll be wearin' two hats as I ride. I got roped into the V.P. corral as well as maintaining the 8-Bit P.D. library. 'Least ways I hope it's the same as wearin' two hats. It'll be a dang sight easier than ridin' two horses. I do hope we can all stand the strain.

A few folks have accepted my invitation to come over and have me help with their problems. Some think that it's an imposition on me but I enjoy working on problems and sharing information. Sometimes we get lucky and actually resolve a problem. Sometimes we have to settle for a reason as to why something can't be accomplished. Then there are those time when all I can say is "I don't know". Usually, however, I can refer you to others who carry expertise in areas that I do not. So, GOT A PROBLEM?--GOT A QUESTION? Give me or another officer a call and give us a chance to assist. Some of these occurrences are learning experiences for us too.

Well, on to the bulk of this article. For the past several months I have contemplated doing an analysis of the menu program that goes out with most disks. Several have expressed an appreciation of its presence so I thought I'd go through it so that you could modify it for your own application.

First of all, credit where credit is due. The bulk of the program and the concept came to me from Jim Chapman with S\*P\*A\*C\*E up in Washington State. Not only did we get the menu but also the philosophy of the picture screen at time of boot-up (with the philosophy came instructions so we could create our own). Jim, a BIG THANKS to you and who ever assisted in it's development prior to its arrival in the Phoenix.

I'll not belabor the menu in it's original design but rather delve into it's purposes and structure. The purpose of this menu is to boot-in at power-up and then with a single keystroke, get a program up and running or at least ready to use. This includes BASIC

SAVED programs, BASIC LISTed programs, MOST binary files and text(documentation) files. Be advised that this is not all done with just a single program. In addition to this program you'll also need a 'MENUFILE.DAT' file and the 'READIT.BAS' program. I have an idea that this article will be somewhat sizeable so I may cover 'READIT.BAS' next month. Suffice it for now to say it is necessary for handling text files.

The following code is the MENU program as it appears on disks that show it to have 33 sectors. Note that anything within curly braces [...] is to be typed in INVERSE VIDEO. The braces are not part of the program.

I usually do this on line 0 for ... saves.  
Reminds me what I'm working with too.

0 REM SAVE"D:MENU

I am clearing a wad of memory to store for storing a file name. This is necessary for 'READIT.BAS' to work correctly.

5 POKE 195,0:FOR X=1 TO 20:POKE 1020+X,0:  
NEXT X

Just some initialization stuff

10 ROW=84:DIM DF\$(40),A\$(40),FILE\$(25),  
PAGE\$(1):FILE\$="D:MENUFILE.DAT"  
20 POKE ROW-2,0:POKE ROW-1,39:IF PEEK  
(209)=255 THEN POKE 89,63:?"[CLEAR]":  
POKE 209,0

Modify the Display List to have a single line of Gr. 2 Text followed by a line of Gr. 1 Text. The remainder of the screen will be in Gr. 0.

30 OPEN #4,13,0,"E":DL=PEEK(560)+256\*  
PEEK(561)+3:POKE DL,70:POKE DL+3,7:  
POKE 752,1:REM POKE 16,64:POKE 53774,64

Take out "REM" to disable the BREAK key (in line 30 above) Modify some colors and print "N.W.P.A.C." while looking for/reading 'MENUFILE.DAT'

```

40 POKE 710,100:POKE 712,100:? "[CLEAR)
[TAB][TAB][TAB][RIGHT][RIGHT]N.W.P.A.C."
45 TRAP 240:POKE 710,100:POKE
712,100:OPEN #3,4,0,FILES$

```

If 'MENUFILE.DAT' is present, read it and put contents to screen

```

50 INPUT #3,A$,X:? "[CLEAR][TAB][LEFT]
[LEFT][LEFT]";A$;"[DOWN]":R=2:TOT=C0
60 TRAP 90:INPUT #3,A$,DF$,N:TOT=TOT+1
70 IF TOT<X THEN POSITION 2+20*C-1,R:?
"[CONTROL B]";CHR$(TOT+192);"(. )
";A$:R=R+2*C:C= NOT C:IF R<>18 THEN
GOTO 60
80 POSITION 1,R+2:? "[CONTROL
B]";CHR$(TOT+192);"(. ) " A$:R=R+2*C:IF
R<>18 THEN 60

```

Hold off displaying too much

```

85 IF R=18 AND PEEK(195)<>136 THEN
POSITION 5,20:? "Press RETURN for next page
or";
88 IF R=18 AND PEEK(195)=136 THEN
POSITION 2,22:? " ";
90 POKE ROW,22:? "[DELETE LINE]
[CONTROL B] (Press LETTER If desired
PROGRAM)[CONTROL V]";:CLOSE #2:OPEN
#2,4,0,"K":N=64

```

If you see something you like, GO FOR IT!  
(But you'll get checked for validity)

```

100 POKE 702,N:GET #2,A:A=A-N:IF (A<1 OR
A>TOT) AND (A<>91) THEN GOTO 100

```

You've come to the end of the file so you'll have to MAKE A CHOICE!

```

102 IF A=91 AND PEEK(195)=136 THEN ?
"[BELL]":GOTO 90

```

The screen is full but we haven't reached the end of the file so erase the part of the screen we don't want and make room for more

```

105 IF A=91 THEN R=0:GOSUB 1000:GOTO 60

```

Oh Goody! You found somethin' you like - Let's see if we can handle it (Pardon my smart-mouth, I sometimes get that way) This reads the TITLE and columnar parameter(if used) from MENUFILE.DAT (Remember, FILES\$="MENUFILE.DAT")

```

110 TRAP 240:CLOSE #3:OPEN #3,4,0,FILES$:
INPUT #3,A$,X

```

Since "A" is the disk file we want we need to get to it

```

120 FOR II=1 TO A
130 TRAP 145:INPUT #3,A$,DF$,X
140 NEXT II

```

We don't care now about A\$, it's just the title that appeared on the screen. DF\$, however, is the name of the file on the disk (This we NEED). "X" will tell us what kind of disk file it is so we know how to handle it.

X=2. This means we probably had more than one page and want to go back and see what we forgot

```

145 IF X=2 THEN CLOSE #3:GOTO 500

```

x=7. This means we need to try to handle a BASIC LISTed file. The Subroutine will atomize our current menu program to keep the corral clean (we don't want no messy stuff in our new file do we!)

```

150 IF X=7 THEN CLOSE #3:GOTO 2000

```

If it's none of the above, get down to line 350 and show us what you're trying to load.

```

155 CLOSE #3:GOSUB 350

```

After it went to line 350 and failed, it came back here X=9. Who asked for DOS??? Why not just boot a DOS disk? Hey! Don't knock it. Just when you think you don't need it, you'll want it.

```

160 IF X=9 THEN DOS

```

Now here's a really interesting situation. Not only do we see that it's a text file but for READIT.BAS' to handle it in a 'User Friendly'(UGH! - I hate that phrase) manner we need to hang on to the file name. This is why we have line 5 above (Somebody needs to clean the computer's drawers once in awhile)

```

165 IF X=3 THEN FOR INDX=1 TO LEN(DF$):
POKE
1020+INDX,ASC(DF$(INDX,INDX)):NEXT
INDX:RUN "D:READIT.BAS"

```

It's a BASIC SAVED file so just RUN the little puppy (I guess this is a catch-all in case it failed at line 350)

170 IF X=0 THEN 210

Be careful using this little maneuver. While it works most of the time (for Binary Files) it is an illegal call so check it out for each program you want to use it with

```
180 OPEN #1,4,0,DF$:POKE 8,0:POKE
9,0:POKE 580,255 185
X=USR(ADR("h[INVERSE ])[INSERT]
[CONTROL INVERSE M][CONTROL
A][INVERSE S][CONTROL X][INVERSE
%])i[space][CONTROL INVERSE
E]jL[INVERSE H][CONTROL U]")):CLOSE #1
```

I don't know why this line is here cause if you ask for DOS, the screen goes blank while it's loading in. Probably one of my actions of ineptitude.

```
190 ? "[DELETE LINE][TAB] (LOADING)
[CONTROL J] DOS 2.5":DOS 200 TRAP
230:OPEN #1,4,0,DF$:POKE 8,0:POKE
9,0:POKE 580,255:GRAPHICS 0:X=USR(5576)
210 POKE 82,2:IF X=0 THEN RUN DF$
220 TRAP 230:OPEN #1,4,0,DF$:POKE
8,0:POKE 9,0:POKE 580,255
230 POKE ROW+1,7:? "[CONTROL B][Can't
RUN:][BELL]":FOR N=1 TO ROW*4:NEXT
N:POKE ROW-2,0:GOTO 90
```

An earlier TRAP statement got us to here because there was no "MENUFILE.DAT" file on the disk (but we want to what's on it anyway don't we!)

```
240 GRAPHICS 0:POKE 752,1:?
"[DOWN][DOWN][BELL]There is no
'MENUFILE.DAT' on this disk. The directory
for this disk is being"
250 ? "[TAB] displayed for review."
260 OPEN #1,7,0,"D:*. *"
270 ? "[DOWN] Filename.Ext
#Sect[DOWN]":SUBTOT=0
280 INPUT #1,DF$:SUBTOT=SUBTOT+1:IF
DF$(5,16)="FREE SECTORS" THEN POKE
82,2:POSITION 12,19:? DF$:GOTO 380
290 ? DF$(2,10);";DF$(11,13);" ";DF$(15,17):IF
SUBTOT=10 THEN 310
300 GOTO 280
310 TOT=TOT+SUBTOT:IF TOT=20 THEN 330
```

320 POKE 82,20:POSITION 20,5:GOTO 270  
330 POKE 82,0:?

Too much for one screen so pressing the key will clear the screen and display more of the directory

```
340 ? "[DOWN]Press (RETURN) to review
more files.":INPUT #16;DF$:? "[CLEAR]":
GRAPHICS 0:POKE 752,1:POSITION 0,5:GOTO
270
```

We got to here from line 155 (Remember?) so now the computer will center the menu description and display it as 'LOADING'

```
350 GRAPHICS 0:POKE 752,1
360 POSITION 2,11:? " (LOADING )"
370 POSITION 20-LEN(A$)/2,13:? A$:RETURN
```

We arrived on this line from line 280. There was no "MENUFILE.DAT" so you probably want to go to BASIC to RUN as disk file or change disks and reRUN this program

```
380 ? "[DOWN]Press (RETURN) to go to
BASIC or (START) to rerun this program."
390 IF PEEK(764)=12 THEN END
400 IF PEEK(53279)=6 THEN RUN
410 GOTO 390
```

The disk has "MENUFILE.DAT" but you've displayed all of the choices and didn't see anything you liked so you want to change disks or flip the current disk to the opposite (If you don't do anything with the disk and press the (RETURN) key you'll just get a repeat of the menu display you just reviewed)

```
500 POSITION 1,20:? "Flip or change disk, then
press (RETURN)":INPUT #16:A$:RUN
```

Now here's a routine that's not too commonly known. It clears only part of the screen. Line 1000 save the old values of screen memory. Line 1005 is the tricky one. the variable "R" controls how far down on the screen to begin clearing (the upper portion of the screen from that point up will remain intact). Line 1010 calculates the new memory screen memory values (for the screen clearing that occurs on line 1020). Line 1020 installs the new values and the performs the screen clearance. Line 1030 restores the previous values as defined on line 1000. Oh yes, we arrived here from line



105 because we do have "MENUFILE.DAT" on this disk and there are more files than can appear on one screen.

```
1000 CC=PEEK(88):DD=PEEK(89)
1005 ADD=CC+DD*256+R+2*40
1010 A=INT(ADD/256):B=ADD-A*256
1020 POKE 88,B:POKE 89,A: ? CHR$(125)
1030 POKE 88,CC:POKE 89,DD
1040 RETURN
```

A moment of confession. I keep thinking I understand how to use memory location 842 values 12 and 13 but I invariably get totally humbled. Designing this little sucker cost me more hours than I'm going to tell you about. But, in any event you got here from line 150. The purpose of this routine is to automatically ENTER as LISTed program. However, if you ENTER a LISTed program without clearing out your current program you will just overlay current program lines with ENTERed lines of code which have identical line numbers and that will cause you a bigger mess than is talked about in nicer social circles. Therefore, it first clears out the current program before ENTERing the LISTed program. Once the ENTERing process has completed you can then RUN it or treat it like any other BASIC program in memory.

```
2000 REM CLEAR CURRENT PROGRAM
2010 REM AND 'ENTER' A NEW ONE
2020 POKE 82,2:GRAPHICS 0:POSITION 2,4
2030 ? "NEW":? :? :? "ENTER":? CHR$(34):DF$
2040 ? "CONT"
2050 ? :? "POKE842,12"
2060 ? :? " to use (Sub)Routine"
2070 POSITION 2,0
2080 POKE 842,13:STOP
```

Well, that about covers it. Opps! I haven't yet described the "MENUFILE.DAT" file.

The following is an abbreviated  
"MENUFILE.DAT" from Disk #201A  
DISK #201A utilities

```
2
DOS 2.5
D:DOS.SAV
9
Read/Write to Hidden (#720) sector
D:SECTUTIL.OBJ
1
Generate M/L clock Routine
```

D:TIMECLOCK.BAS

0

Typers' Toolbox - Subroutine

D:TOOLBOX.LST

7

Repeat this menu program

D:MENU

2

The first line identifies the disk for which the file was created. The second line is just a number which controls the number of columns that will appear on the menu screen. Most program names/file descriptions will occupy over half of the screen width so I just use a "2".

I used to try to do double column displays but that caused a problem in trying to abbreviate and still display sufficient information. Besides, at that time I hadn't run across the partial screen routine that I currently use.

The remainder of the file is in multiples of three lines. The first line is what will appear on the menu screen. Don't let it be longer than about 36 or 37 characters or you'll get screen wrap and mess up the menu display. The second line (of the three) is the disk file name. The third line is the number that tells the menu program what to do. In summary, they are as follows:

0 = A SAVED BASIC File  
1 = A Binary File (Machine Language)  
2 = ReRUN the MENU program  
3 = A text file to be processed by the 'READIT.BAS' program.  
7 = A LISTed BASIC File  
9 = RUN DOS

If you come up with other type of files to process you can use other numbers and incorporate them into the menu program and this file.

THERE! I think that's it. Next time I'll go into detail on the 'READIT.BAS' program as I am sure this article has grown big enough. If you have any questions about this routine, contact me at the meeting or call me at home (278-2375).





# The Best Of .... 1988

## Public Domain ST Software - Part 4

By George Terpening, S\*P\*A\*C\*E

This is the fourth article in "The Best Of..." series. This month I will continue the subject of ACCESSORIES. As stated last month, I've divided the accessories into five sub-categories. I have previously picked the top accessories in the System and General sub-categories. This month I'll cover the Text/Graphics sub-category. I will pick the top three, five, or ten in each group and provide a thumbnail description of each accessory. *(This collection of programs will be available in a special series of disks released in the S\*P\*A\*C\*E ST Library. So far the series includes: Best #1 - System Accessories, Best #2 - General Accessories, Best #3 - Text/Graphics Accessories (this month).)*

This month the picks are in the areas of Text Processing and Miscellaneous (that's what is left over). Text Processing is one of the most important of all of the sub-categories. My picks for this category are:

1. WORD400A.ACC
2. TYPEWRIT.ACC
3. TEXT\_UTL.ACC

Honorable mentions are:  
ENVELOP.ACC and  
NOTEPAD.ACC

The programs in this sub-category were not too hard to separate from the rest of those available. The first three represent some fine work, and when you need one of them, you will be glad they are available. The last two are included because, they too, are nicely done. They will not be used by everyone since ENVELOP is only for HP Laser printers and NOTEPAD has limited functionality. Nevertheless, they deserve mention.

The Miscellaneous sub-category has been divided into two parts. They are General and Specialized. The General part has utilities which can be used by anyone. The Specialized section contains accessories which are well designed to work with a single product. The picks for this sub-category are:

1. TINYTOOL.ACC - tie -  
MEMFILE20.ACC
2. MOUSEPD.ACC
3. KIWKPIC.ACC
4. EXTAKEY.ACC
5. PASSWORD.ACC

These accessories provide you with some basic functionality which also is available in program form. The advantage to these is that they can be used from inside a GEM program.

This last sub-category presents something of a problem for me. The programs don't fit some of the requirements I have for most programs. I usually like only to address programs and accessories that have broad usage. Anyway, I've varied from that requirement because the following picks were well done and, in each case, fit a need I perceive in the reading audience. The picks for the Specialized sub-category are:

1. PRINTERS.ACC
2. FX85.ACC
3. JETSET.ACC - tie -  
OKIDUMP.ACC

The **WORD400A** accessory is the second best PD word processor available for the ST *(The first, in my opinion, is STWriter Elite)*. The author, Gregory Schneller has supported the program very well over its life. It has lots of extras which are associated with most good commercial word processors.

**TYPEWRIT** by F. P. Nagel is a simple single line editable typewriter accessory. It allows you to send special characters to your printer.

**TEXT\_UTL** is a program which lets you print your program listings with special formatting such as headers and page breaks. The output from the program can optionally send to a file or the printer.

**ENVELOP** is a speciality program that was so good that I had to include it in this section. It allows you to setup for and printout text on an envelope using a HP Laser Jet II printer.

**NOTEPAD** is a small program that allows you to store a note to yourself. It is suppose to let you store multiple note, but I wasn't able to get this feature to work. This function is included in the DESKPAK accessory described a couple of months ago.

**TINYTOOL** allows the user to view and edit any part of the ST's memory, a file, any disk drive, or an individual sector of any drive. If you use

this program, only use it on a backup copy of the file or disk. If you use it on a hard disk - beware!

**MEMFILE20** allows the user to view and edit any part of the ST's memory, a file, any disk drive, or an individual sector of any drive. If you use this program, only try using it on a backup copy of the file or disk. If you use it on a hard disk - beware!

**MOUSEPD** allows you to set the speed your mouse moves across the screen from a slow rate of times 1/16 to a fast rate of times 8.

**KIWKPIC** allows you to view NEO and Degas pictures. It will allow you to view both low and medium resolution pictures on a color system, but only high resolution pictures on a monochrome system.

**EXTAKEY** is a program which allows you to generate and send a character string to a GEM program. It sounds useful, but I haven't found a need for it yet.

**PASSWORD** allows you to create a password which must be used the next time you boot up your system.

**PRINTERS** is a printer setup program. It allows you to set different characteristics for most any type of printer. This includes the ability to send control sequences to the printer.

**FX85** is a setup program for Epson FX85 printer.

**JETSET** is a setup program for the HP Deskjet printer.

**OKIDUMP** is a screen dump program for Okidata printers.

Well, those are the selections for this month. They all can be found on "The Best of..." series Disk No. 3 available in the stores where other S\*P\*A\*C\*E club disks are sold. I should also note that all of these disks are double sided. *(Editor's Note: These programs should also be available from the libraries of other users groups as well.)*

Next month I will continue the series by starting the coverage of Utilities. So long until then.

.....

# A VIDEO MODIFICATION FOR YOUR ST

## Get Improved Color Output From The SC1224 Monitor!

By Rich Gratzel, S\*P\*A\*C\*E

**WARNING:** This modification project should be performed only by individuals with appropriate electronics experience.

If you're one of the poor unfortunate souls who, like me, purchased a middle era SC1224 monitor for your ST, then you are a very likely candidate for this upgrade....

I suppose the first thing people noticed about the 2nd generation SC1224's was the new case style. And probably the next thing that grabbed their attention was the difference in the video quality when compared to the original version. The new models exhibit excessive luminance peaking, pixel width distortion, character distortion due to non-symmetry of the rising and falling edges during pixel on/off transitions. Moire' distortion, and just plain lousy contrast. This modification will address all of these problems except for the Moire' patterns.

### THE FIX

Look at the schematic (Atari - ST RGB Driver Circuitry). What you need to do is remove three 68pf capacitors and three 82 ohm resistors inside your SC1224 monitor. They are located on the same side as the control knobs, in the rear corner. For even more improvement you can also remove the 100 ohm emitter resistors and the 22pf capacitors in each of the three transistor circuits inside the ST. However, I don't recommend this for novices or hardware hackers as it requires additional adjustments which may be difficult to accomplish with precision.

### WHAT IT DOES

The circuit in the 1224, comprised of the 68pf capacitor, resistor R1, and the drive-pot is called a peaking circuit. Its purpose is to speed up rising and falling voltage transitions which are slowed due to stray capacitance from the signal line to ground within the monitor cable and associated signal paths. The 22pf capacitor in the ST is also a small contributor. In all the monitors I've modified I felt that the luminance peaking was excessive. Removing the three 68pf capacitors in the SC1224 eliminates that problem. When we're finished with our mod, a peaking circuit will no longer be required anyway.

The three resistors: 100, 27, 82 ohms, present a 50 ohm emitter load to the 2N3904 driver transistors. This is generally considered good as low impedance circuits offer good noise immunity, and help to 'tune' out the capacitance in the transmission line. Also, matched impedances at both ends is desired if possible. The reason that we need to change this circuit lies somewhere else....

The root of the problem is the poor impedance-match between the shifter video chip and the RGB driver transistors. The signal coming from shifter arrives at the base lead of the transistors, thru a cluster of resistors which provide 8 distinct levels of intensity to each of the three color guns. This series source-resistance, along with the relatively low input-impedance of the transistor is what causes the poor hi-frequency response. Removing the three 82 ohm resistors in the SC1224 helps to compensate for this by reducing transistor currents and increasing the input-impedance at the base lead. This allows the shifter IC to bleed off the carriers in the transistor much faster. The pixel edges will be sharpened, pixel-width distortion is improved, and the peak to peak amplitude should increase along with a little bit of positive DC offset. The character distortion that I mentioned earlier should also be history at this point!

If you choose to do the optional mod to your ST, it's OK to do so. The picture will improve less significantly and you should trim the RGB-drive pots (potentiometers) to restore the amplitude and offset to near original specifications. This may alter your color-mix so check yourself against a game screen with lots of colors that you know by heart!

Your black text on white should now look nicely "fat" and clear, and you should also have more brightness and contrast. White text on black will still be a little wider, but hey, that could even be the monitor saturating or bleeding a bit!

### MORE?

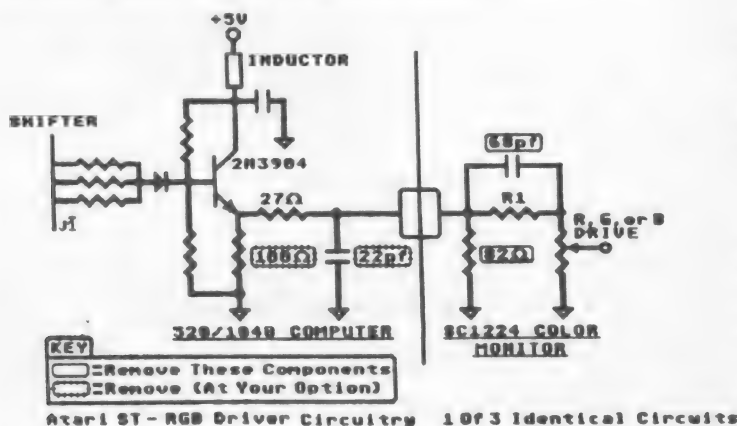
Yeah, we've got it open so let's tweak! These adjustments must be performed with the monitor turned on. If you want more brightness or better focus you can find the plastic slotted adjustment shafts in the rear, same side as the speaker. Also toward the front, same side as the speaker you should see a coil with a slug (i.e., a solid ferrite core) in the center. Turning this slug counter-clockwise should bring it outward and expand the picture screen horizontally. This also helps the clarity of medium resolution text. The vertical size adjustment can be accessed at any time at the back of the unit. The RGB-drive pots can be found, loafing around in the shade of the external brite, contrast, volume knobs if you do need to trim them. Also, before making any adjustments, allow your monitor to warm up for a good 30 to 45 minutes. It takes that long for things stabilize.

### CAUTION!

When removing the back half of the monitor case, go slowly. There is a twisted pair wire going to the speaker that needs to be disconnected before the case is completely separated. Also, go to Radio Shack and buy yourself a plastic adjustment tool for working in live HIGH-VOLTAGE circuits, keep your left hand in your pocket and work with your right, and never work on a live monitor without someone else near. Guess why! ... Yup, it's dangerous! Be careful!

We are helping people to do this modification at the S\*P\*A\*C\*E Hardware SIG. If you need assistance give me a call and we can make arrangements to get yours done too! Lastly, I have seen some of the older SC1224's that exhibit a bit of peaking and could possibly benefit from parts of this modification and we can also do minor convergence adjustments if required on all models.

Hey! Good Luck... and see you at the next Hardware SIG meeting! RICH G.







# ST DRIVE SWITCH

(15)

by Bill Pike (PAC)

C PAUG 4-89

If you have a 520ST or 1040ST with a internal drive that drive is always DRIVE A and the external drive is DRIVE B. This is fine until you want to boot a disk from the external drive or the internal drive needs to go the the doctor. You are then up the proverbial estuary without the necessary means of propulsion.

Anyhow I have added a switch to my 520ST that will switch the drives making the external drive DRIVE A and the internal drive DRIVE B. This allows you to select which drive will be your boot drive and allows you to operate without a internal drive if necessary. It will also allow you to switch drives, in mid-stream if you have the disk in the wrong drive. You will have to wait until the drive activity light goes out, meaning that the computer is no-longer accessing a drive or you could bomb/kill the disk.

DO NOT ATTEMPT THIS MODIFICATION UNLESS YOU HAVE DONE WORK ON COMPUTER BOARDS BEFORE OR HAVE PREVIOUS EXPERIENCE WORKING ON PRINTED CIRCUIT BOARDS AND IC CHIPS.

HERE IS THE NECESSARY DISCLAIMER: NEITHER THE AUTHOR OR THE PORTLAND ATARI CLUB TAKES ANY RESPONSIBILITY FOR THE RESULTS OF THIS MODIFICATION INCLUDING BOTH SOFTWARE AND/OR HARDWARE DAMAGE IF THIS MODIFICATION IS PERFORMED. THIS MODIFICATION WILL ALSO VOID ANY WARRANTY ON YOUR COMPUTER.

This modification has worked on quite a few computers that it has been used on and the only problem seems to be that some computers might try to write to the disk on boot up but I have had no problem in this area. Anyhow you might want to write protect your boot disks, this is a good idea anyway.

Now to the actual modification. You will need a Phillips Screwdriver, a small slot head screwdriver, a set of needle-nose pliers, a set of

wire strippers, a set of diagonal cutters, a small soldering iron, de-soldering wick or a solder-sucker, and a 1/4" drill. That concludes the listing of the tools. Parts required are; a sub-miniature Double Pole/Double Throw switch, and about 3 ft. of number 26 or smaller hookup wire.

First the computer selects which drive is going to be used by the YAMAHA (YM2149F) chip labeled U-19. This is the I/O interface chip. The chip sets in the back-center of the board and is next to the RF Modulator which is a silver-rectangular box located just to the right of the center of the back section of the board. Clear a fairly large area on a table and have good light, you will have things spread out over a fairly large area.

#1 disconnect all cables hooked to the computer and turn the computer over on its face with the bottom facing you and the keys next to you. You will see several screws (Phillips head) on the bottom. Remove these screws, three of them will be much longer than the others. Also keep separate, by length, screws that are the same and remember where they came from.

#2, slip your hand under the computer and hold the top and the keyboard in place. Then turn over the computer so that it is right-side up.

#3, carefully lift the top off the computer and set it aside. You will note that the keyboard is left on the computer.

#4, carefully lift the keyboard and note that it is attached to the computer by several wires. and a plug on the right hand side. Carefully remove the plug from the computer board and set the keyboard aside.

#5, you now to remove the internal drive. There is a metal shield over the cables connecting the drive to the computer on the left side of the drive unit. There are one or two screws holding this small shield, remove

these screws and remove the shield and set it aside. You will see a flat ribbon cable, with a plug on it, and several colored wires that go to a plug on the back of the drive. Carefully lift the right hand side of the drive, the side with the disk slot, slightly and then lift the drive and move it slightly to the right. You can then remove the flat ribbon cable by gently pulling on the plug connected to the drive. The other plug has a retainer as part of the jack that it goes into, this is a small pin on the jack that engages a small slot in the plug, lift this with a small slot head screwdriver and pull the plug gently loose.

#6, you now need to remove the Power Supply. There may be a small shield covering the wires connecting the Power Supply to the main board, remove the screws holding this shield and set it and it's screws aside. You may or may not have this shield on your computer. There is a small plug connecting the Power Supply to the main board, remove this plug. You may now lift the power supply clear and set it aside. Older models may not have a internal power supply.

#7, you will now see the RF Shield this is held in place by a series of twist clips along the edges. Twist each of these clips to line up with the slot that it is in then gently lift the shield. DON'T FORCE IT. Once you have the shield off set it aside. You are now able to remove the bottom shield by turning the main board over and removing the shield, do so. Turn the board back upright.

#8, now locate U-19, this is the fabled YAMAHA chip, this is a 40 pin chip with the

label YM2149F on it. Inspect the chip, on one end you will see a dot on one corner, this indicates that the pin, leg, in that corner is number 1. Count down the pins, starting with that pin until you find pins 19 & 20, these should be the last pins on that side of the chip. VERIFY THAT THESE ARE PINS 19 & 20 UNTIL YOU ARE SURE. Now turn the board over and locate the same pins on the bottom of the board. VERIFY THIS UNTIL YOU ARE SURE.

#9, BE EXTREMELY CAREFUL AT THIS POINT. YOU CAN EASILY LIFT A CONDUCTOR FROM THE BOARD. Now take your soldering iron and the solder-wick or solder-sucker and clean out the holes these pins go thru. Now take the needle nose pliers and gently loosen the pin from each hole. MAKE SURE THAT YOU LEAVE NO SOLDER SPLASHES OR BRIDGES ON THE BOARD.

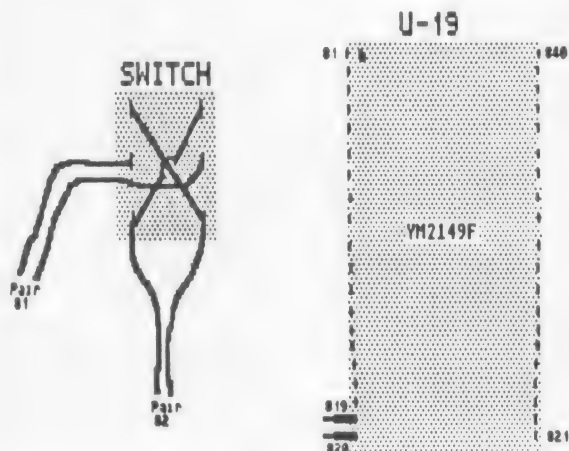
#10, you will now need to drill a hole in the case to put the switch thru. I would suggest a spot between the printer (parallel) port and the external disk drive port. Check that you will have to drill thru the bottom shield just the plastic and that the switch will clear everything.

#11, Cut 2 pieces of wire and bare each end. Connect the outside pins of the switch together in the form of a X. Cut 4 lengths of wire 6 inches long and bare both ends. Bare both ends of each piece and solder these pieces to the center terminals and one set of end terminals, it makes no difference which end. Twist the wires that go to each pair of terminals together for identification.

#12, Install the switch.

#13, now back the the chip. Using the needle-nose pliers, from the top of the board gently lift the two pins (19 & 20) clear of the board and bring them out from the side of the chip. BE VERY CAREFUL YOU DON'T BREAK A PIN. DON'T BEND THEM TO MUCH, JUST ENOUGH TO CLEAR THE BOARD AND HAVE ROOM TO REACH THE HOLES THEY CAME OUT OF.

#14, cut the wires from the switch to reach to the pins of the U-19 chip and strip the ends. Then take one pair of wires and insert them



(continued from page 6)

chips, or even ROM or static RAM in this area.

The AND gate serves to generate the signal to load the register. The output of an AND gate is high if and only if all of it's inputs are high. LDS is the strobe for the lower ( odd ) bytes of the memory words, and R/W is the read/write select line. Both these are active low, so we must run them through inverters.

The OR gate prevents RAM from being accessed when the bank select register is loaded ( remember that Glue 'thinks' the bottom 4 Meg is being accessed except when both A22 and A23 are high. This is necessary to prevent a bus error when writing to the bank select register ). The output of an OR gate is high whenever one or more of it's inputs are high. The RAM select signal is active low, so it is effectively blocked when either of the lines going to the OR gate from the decoder is active.

The bank select decoder is shown with 2 inputs and 4 outputs, but could have considerably more ( with a larger latch as well ). An 8-bit latch with the appropriate decoding circuitry could bank switch 512 Meg of RAM ( with 2 Meg banks ), and a 16 bit latch/decoder... let's not get carried away here.

Anyway, that's what I have. Even if none of this is ever built, I hope you all have learned something about your ST.

(continued from page 8)

so check all circuits for continuity. Making sure that I didn't get continuity through two lines at one point. Some of the needed material could have been picked up at Radio Shack, but when I asked for an Atari Joystick extender cable and the clerk said they "only carry stuff for real computers", I calmly explained that the Atari is a real computer and walked out.

TABLE 3 did not tell me what to do with the GRAY cable, so I just twirled it around a post inside the case and left it at that. Evidently, it is not needed.

D. E. Wenzelburger and R. K. Deen make no guarantees that this modification will work for you. You are responsible and liable for your own actions. However, if you carefully follow the above directions, are competent with electronics, and use common sense you should have no problems making this modification.

Remember though that by making this modification you may be voiding your warranty on the trakball. I was able to complete the project in under two hours. Take your time and Good Luck!

(continued from page 15)

thru the open holes, that you removed the pins from. Take the other pair of wires and solder them directly on the pins of the chip. Turn the board over and solder the wires that you poked thru the holes. Neaten up the wires.

**VERIFY ALL CONNECTIONS AND THAT NOTHING IS TOUCHING ANYTHING IT SHOULDN'T BE ALSO THAT THERE ARE NO SOLDER BRIDGES OR SPLASHES. THIS COMPLETES THE MODIFICATION.**

**#15, Repeat steps #7 thru #1 IN REVERSE ORDER to reassemble the computer.**

**#16, Connect the external drive to the computer and also connect the power and monitor. If the computer fails either of the next tests something is wrong, shut the computer down and re-check what you did. Turn the computer on and verify that the activity light on one of the drives comes on and that the screen display is normal. Turn the computer off and change the drive select switch. Turn the computer back on and verify the other drive activity light comes on and that the screen display is normal. If these tests are OK you have correctly installed the switch.**



# ST Hard Drive MOD

(21)

By Larry Landon, A.U.G.I.E.

In the Oct 88 issue of PSAN there is an article on modifying the ST Computer so it will allow a hard drive to come up to speed before booting the computer. Well I would like to take that mod one step further.

The first article is designed to allow a fourteen second time period for the hard drive to come up to speed and that's good, but the thing that concerns me is when you don't want the hard drive you still have to wait fourteen seconds. I made the following changes to the original mod. I kept the original resistor and paralleled it with another resistor of 560k and added a switch. I used a single pole double throw (SPDT) miniature switch that I had in my junk pile.

A new switch can be purchased at almost any electronic store, so I won't recommend any particular brand. I installed my switch on the left side of my St because I am Left handed, put yours where ever you think it's convenient for you. Be careful not to short anything out with the wires or where you solder them.

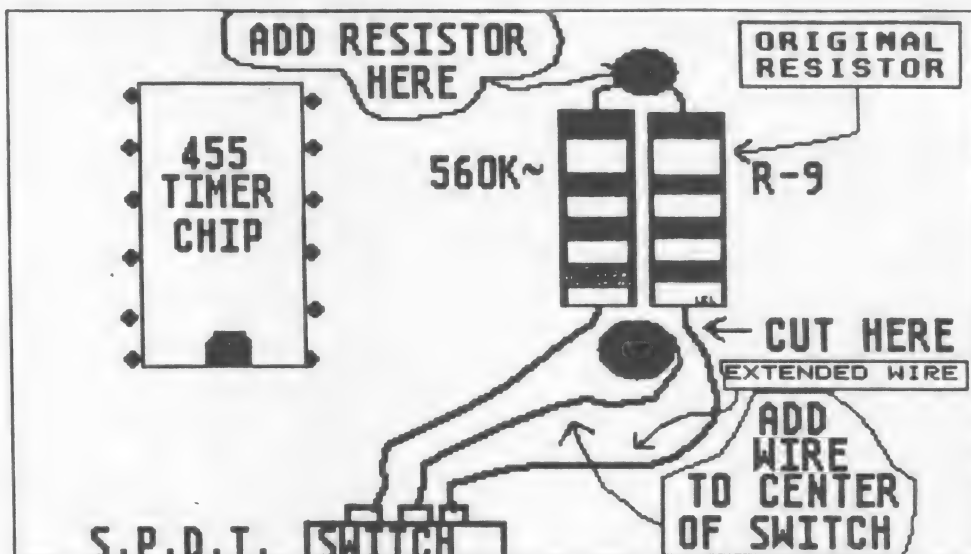
## The MOD is Very Simple

The mod is very simple, cut one end of R9 resistor's lead from the board solder pad, it's **IMPORTANT!** to leave enough lead on both ends of the cut to solder the wires you are going to add. Add two pieces of wire, one to the solder pad where you cut the R9 resistor and one to the end of R9 itself, make them long enough to reach where you want to mount your switch (use some old phone hookup or speaker wire). It won't take anything large because it does not carry much current. Follow the diagram, solder the 560k ohm resistor to the solder pad at the uncut end of the 12k ohm R9 resistor. Solder the other end of the 560k ohm resistor to one side of the SPDT switch. Solder one of the wires from the cut side of R9 attached to the resistor to the other side of the SPDT switch. Attach the other wire to the stub left

from the cut lead of R9 that is attached to the solder pad and the other end of the wire to the center of the switch. **Look at the diagram** this is what the finished product should look like when you are finished.

in the Start Gem "Inf" file with a word processor "C:\AUTO\BBS.TOS" and saved it in ASCII.

Now I turn on the hard drive, and the Computer with the switch in the time



When you turn the computer on with the switch in one position the set will act like any normal ST. Then in the other position there will be a fourteen second delay. If you have an Auto Boot sector the rest is history. My personal preference

delay position, the hard drive comes up to speed, the computer waits until it times out then it fires off the disk "Inf" files, it reads install hard drive, then it looks for the path name, then the program loads and the BBS is ready to receive a call on the phone. The only thing that is not perfect is the time is off from a power up condition and I am trying to get a built in clock to solve that problem.

I can not make any guarantees as to the performance of this mod for legal reasons. If you make this mod you do it at your own risk. It works for me and that is all I can vouch for.

is using a public domain program called Start Gem which allows you to set all of the parameters for booting and program execution. I am using it on our BBS so it will auto boot in case of a power failure.

### What ???

That's right auto boot in a power failure. I put Start Gem in an auto folder on drive A with the program "AHDI" to start the 20 Meg hard drive. Then I put the BBS program in an auto folder on drive "C" and give it a tos Extender. I typed

## The DISK ORGANIZER

A Division of Morcom Enterprises

STEVE DRAKE  
MANUFACTURERS REPRESENTATIVE

8307-27th NW  
SEATTLE, WA 98117

COMPUTER ACCESSORIES  
(206) 782-3691

# ST

## TWEETY BOARD

FROM PRACTICAL SOLUTIONS  
for the 520/1040/Mega systems

NWPAC

3-89

22

Reviewed by Dave Thorson, NWPAC

Hi ho. It's finally getting warmer outside, and the birds are chirping again. Or was that the boards? I tawt I taw a Tweety Board! I did! I did see a Tweety Board. At our last PHAST meeting we got an excellent demo of Tweety Board, the newest practical solution from Practical Solutions. It brings the three sound channels of an ST out of the computer and into a stereo for the finest in ST listening enjoyment.

In the demo, two of the three channels were connected together with a "Y" cable adapter (supplied with the Tweety Board), and the resulting two channel sound was fed through a larger than average boom box, with speakers separated to opposite ends of the table. The sound was incredible. I had to get one! I paid my bucks (Computer Works offered us a good deal at the meeting, but the list price is about 60 smackers) and brought home a cardboard box. Inside I found instructions, a ribbon cable connected to a small circuit board, another cable with three RCA phone jacks on the end, and the famous "Y" cable.

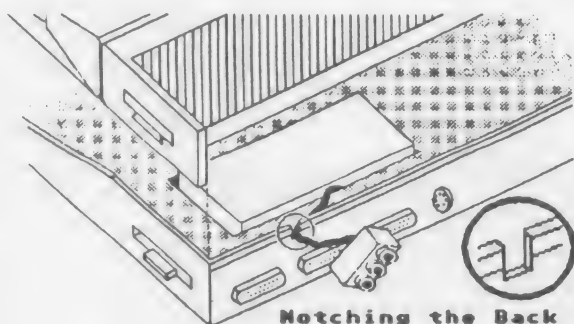
This looked to be a Serious Project, one where the computer must be opened and pieces removed. Since no soldering was required, I decided to jump in and install the board myself, knowing that Computer Works would be happy (for a fee) to fix any damage I might cause. The instructions were clear, with separate sections for 520's, 1040's and Mega computers. Good advice was also included, preventing many potential mishaps. I had some trouble getting the upper shield off the base so I removed the power supply in addition to all the book demanded.

I quickly found the recommended spot to stick down the circuit board (it's held down by sticky tape) and with only a little trouble had the ribbon connector piggy-backed onto the sound chip (and also held down by a sticky tape). I tucked the ribbon aside to a Safe Place, reconnected the disk drive, turned in all the screws and twisted back the metal tabs holding down the upper shield. I snaked the output cable through the hole for the hard disk connector as the manual recommended. I even got fancy and filed a notch in the plastic to accept the cable without interfering with the hard disk connector.

All was well until - what's this? The top won't settle down. Hmmm, the instructions say to jiggle it around until it settles. Nope, that doesn't help. Could it be that the output cable, squished between the back of the plastic case and the upper shield, is so thick that things don't fit together right? I disassembled everything again and decided to run the cable out near the top, through the shield hole for the disk drive. I filed a new notch in the back, at the top edge of the base, and it seemed all was working well. Almost. The top still didn't fit.

On closer inspection (that thing you save to do last, even after Reading the Instructions), I found a support column connected to the top was supposed to pass through a hole in the shield, through the ribbon cable, and down to the circuit board where a screw from the bottom would connect with it. Ah Ha! There was no hole for the column in the ribbon cable. The ribbon cable wasn't in a Safe Place. Operator Error.... I re-routed the cable and, after so much practice, assembled the computer in mere seconds. After several moments of silent hesitation (or was it prayer?) I turned on all the switches. Everything worked. Whew!

So, what do you do with three sound outputs? They can be connected up to three amplified speakers for the ultimate surround-sound environment, or connected to a stereo and one amplified speaker, or combined into one or two channels with mixers or Y connectors, depending on your budget and requirements. You DO need some form of amplifier to make the sound audible through headphones or speakers. I have an old Nakamichi 500 cassette



deck that accepts two line inputs and three mic inputs (left, center and right channels) and has a front panel of sliders to mix all these signals. It's not connected to my stereo, but I have some headphones for listening to tapes.

I've also been known to send the headphone output to my guitar amp for somewhat louder (if not stereo) sound. It looked like an ideal place to send Tweety Board's output. I dug out and dusted off an old mixer from Radio Shack that lets me mix four inputs down to two (stereo) or one (mono). I checked at Radio Shack and found they no longer sell the mixer, but offer a much better one for (the much higher price of) \$79. Anyway, I connected ST channel A to the left mixer channel, and ST channel B to the right mixer channel, and used the Y connector to split ST channel C into both left and right mixer channels. The mixer output goes to the tape deck inputs. I use stereo mode for most stuff, and switch it to mono for games with digitized sounds.

The manual states that Tweety Board may detract from the quality of digitized sounds, and they do sound terrible when split across several channels. Fortunately they regain most of their content when mixed back together. I've also got my synthesizer and guitars hooked into the mic inputs, so they can be mixed in with the ST's sound. A low-budget musician's paradise!

Tweety Board works in parallel with the sound circuits in the ST, and both can be used at the same time. Apparently Tweety Board bypasses the amplifier in the ST (in the monitor?) which has an extremely limited frequency response. The sound is much cleaner and volume levels are more consistent from low to high notes. Bypassing the monitor speaker and using headphones or stereo speakers adds another marked improvement to the sound.

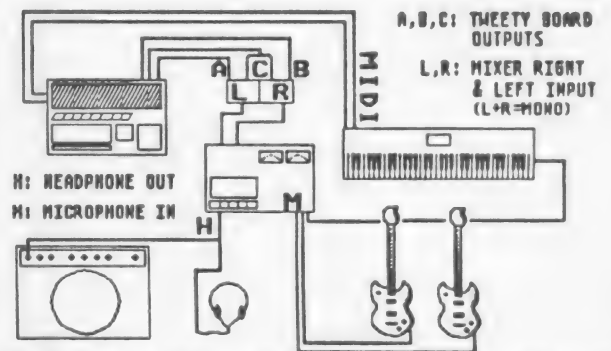
But, is the stereo sound worthwhile? I do a lot of music work, some with the synthesizer and some with the ST's internal voices. Music Studio is my main music composition tool, and it doesn't give me very precise control over which channel is used for each note. I had dreams of using three ST channels and four synth channels for a total of seven possible sounds at one time, plus guitar or bass. Well, Music Studio is not the tool for this. I found no obvious way to assign notes to channels: notes intended for MIDI output kept creeping through Tweety Board, giving a different sound than intended. Still, another program might handle this very well (or one could be written).

In more general usage, Tweety Board adds a LOT to games like Gold of The Realm which has music and non-digitized sound effects. The swooshing of the gargoyles has to be heard to be believed although the stereo echos of the footsteps takes getting used to. The music takes on a new life as notes dart around the stereo spectrum. The opening theme from Music Studio sounds amazing.

I can safely recommend Tweety Board to anyone who likes sounds and music and wants to hear them clearer. I can envision games and educational programs where stereo sound placement is a major contributing factor. Imagine a stereo pong game as a start, and let it take off from there. It's unfortunate Tweety Board is not standard equipment on Atari computers because it may take a while to break the chicken-egg syndrome of developing software without a solid hardware base or selling hardware without an abundant supply of software to take advantage of it.

Tweety Board may get lucky here since so much ST software uses sound and can be enhanced without changes to the original programs. As a tool to help mix ST sounds with the rest of my setup, it shows a lot of potential. It's not an essential peripheral, but it adds value to all the rest of your software that uses sound effects or music.

Tweety Board may open up some new applications as well with its stereo (and even tri-aural) capabilities, finding use in game, education, music, and art programs.



AN ATYPICAL TWEETY BOARD SETUP



## Pepper . . . and Salt

### Ewe Said It!

("Penned sheep gain weight faster than those on pasture," stockman declares."—News note)

After years of experimentation,

Sheep raisers are in accord:  
Confined sheep grow faster,  
Thus proving the pen  
Is meatier than the sword.

—George O. Ludcke.

### Dangerous Denial

Dire warnings on heart-attack factors

Have brought change to me  
and my buddies,

For though we've not altered  
our life styles,

We have stopped reading the  
studies.

—Edward F. Dempsey.

THE WALL STREET JOURNAL



"Believe me, Mrs. Folger, you won't find a steadier hand than your surgeon, Dr. Henpenny, who shoots in the low 70s."

## Pepper . . . and Salt

### Mental-Health Habit

I've heard emotions make  
you ill,

And so I say of late,  
Whenever I feel out of  
sorts,

"It must be something I  
hate."

—Bruce Kafaroff.

### Wise Warning

When your cup runneth  
over, don't runneth the car.

—Ivern Ball.

### Daffynition

Stud-farm resident: hubby-  
horse.

—Daisy Brown.

THE WALL STREET JOURNAL



## Pepper . . . and Salt

### Rule of Brevity

Business meetings run too  
long.

A remedy to see  
Would be to schedule confer-  
ences

On Fridays after three.

—Ralph Shaffer.

### Candid Comment

The trick in politics is to get  
in the public eye without irri-  
tating it.

—Arnold H. Glasow.

THE WALL STREET JOURNAL



"Jennifer studies for tests. Everybody's got some kind of gimmick."

## Pepper . . . and Salt

**Foreign Body Language**  
While the left brain handles  
daily chores,  
The right side's our creative  
seat;  
And nature, of course, has  
designed us  
So the two very seldom  
meet.  
—Edward F. Dempsey.

**Hostile Rakeover**  
Message on an office wall:  
"This department doesn't  
need any physical-fitness pro-  
grams. Everyone gets enough  
exercise jumping to conclu-  
sions, flying off the handle,  
knifing friends in the back,  
running down the boss, dodg-  
ing their responsibilities and  
pushing their luck."  
—Herm Albright.

**Candid Comment**  
Airlines search for weapons,  
then with first-class meals  
they give you a steak knife.  
—Marvin Alisky.

THE WALL STREET JOURNAL



"It says, 'Thank you for using AT&T as your long-distance carrier.'"

## Pepper . . . and Salt

**Domestic Skill**  
To arrive in time for parking  
spots,  
And before bargain prices  
start climbing,  
Current family food shoppers  
must be  
Experts at market timing.  
—Edward F. Dempsey.

**Snooze Button**  
Films rated "R" and "X"  
Are exceedingly boring to  
me.  
For my elderly viewing dis-  
cretion,  
Please rate them "Z-Z-Z."  
—Thelma Beckler.

**Candid Comment**  
An expert is one who may  
not have all the answers, but  
is sure he could get them  
with the proper funding.  
—Ivern Ball.

THE WALL STREET JOURNAL



## Pepper . . . and Salt

### Vital Statistics

Along with one's golfing  
handicap  
And your latest stock-killing  
amount,  
The figures about which we  
modestly brag  
Should also include our cho-  
lesterol count.

—George O. Ludcke.

### Out Is In

Though outdoor types claim  
great health benefits,  
As pollution awareness  
soars,  
Soon campers might be  
spending weekends  
In the safety of the great in-  
doors.

—Edward F. Dempsey.

### Daffynition

Museum heist: haul of  
frame.

—Rodney Stevens.

THE WALL STREET JOURNAL



"Dealing with demons and evil spirits is  
easy—what I hate is filling out the insurance  
forms."

## Pepper . . . and Salt

### Earache

My ears don't work like they  
used to,  
And I must admit that I fear  
it.  
When the roll is called up  
yonder,  
What happens if I don't hear  
it?

—Rollin S. Trexler.

### Final Destination

I pay my taxes in a rage,  
And pray for dire solutions,  
Knowing they'll be used to  
buy

More campaign contribu-  
tions.

—Richard F. Barrett.

### Designer Disease

Would you call a middle-  
aged executive's sports car a  
Menoporsche?

—Philip R. Alper.

THE WALL STREET JOURNAL



"Eureka! I just thought of a way to obtain  
another grant."



## Pepper . . . and Salt

### Vocabuleery

When taking notes  
Is called "minuting"  
A quick departure  
I'm executing.  
And a steady hand  
Is what I need  
When a novel is rated  
"A good read."  
I might accept those twists  
With teeth a-grit,  
But must you call an English-  
man  
A "Brit"?

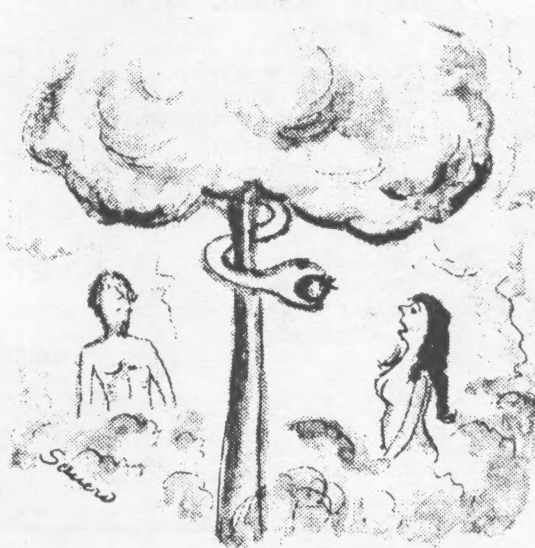
—Dow Richardson.

### Suspended Aviation

When the stewardess says  
airily,  
"We'll be landing momentar-  
ily,"  
It is a bit of a mystery  
How it becomes invariably  
The longest moment in his-  
tory.

—Marilyn P. Donnelly.

THE WALL STREET JOURNAL



"... but what about Alar?"

## Pepper . . . and Salt

### Ecology Unbalanced

As tropical rain forests per-  
ish, the mail  
Pours down upon one without  
fail;  
Much as I pity the plight of  
the trees,  
I can't see the forest for the  
pleas!

—Ruth Boorstin.

### One on One

What a car owner needs, lest  
the sun and the rain  
The laborious luster dimin-  
ish,  
Is a coat of wax to protect  
the coat  
Of wax that protects the fin-  
ish.

—Richard Armour.

### Candid Comment

When your husband says  
he's at your disposal, he  
probably means he's standing  
beside it.

—G. Sterling Leiby.

THE WALL STREET JOURNAL



## Pepper . . . and Salt

**Willing to Wait**  
 "This is our final offer"  
 Is an ultimatum, so to  
 speak,  
 That I'm inclined to take  
 With tongue in cheek.  
 Unhurriedly, serenely,  
 With time at my disposal,  
 I settle back awaiting  
 The next proposal.  
 —Dow Richardson.

**Prisoner of Wire**  
 Whenever I'm put  
 On hold, I see  
 Myself held hostage  
 Electronically!  
 —Bert Murray.



"I called your office to tell 'em that you wouldn't be in today, and they said, 'who?' "

## Pepper . . . and Salt

**Titillating Titles**  
 The radical left  
 And ultra right  
 Employ their names  
 To signify might.  
 The liberal's response  
 Should pose no riddle:  
 More power to  
 The neo-middle!  
 —Joshua Adams.

**Mr. Cliche**  
 He's certain to find  
 An axiom to grind.  
 —Robert Fitch.

**Daffynition**  
 La Boheme heroine's aria:  
 Mimicry.  
 —Jim Black.



"They're called 'crayons,' Stevie—you can use them to generate graphics."

## Pepper . . . and Salt

**Too Simple**  
 Many cures are proposed for  
 the deficit,  
 But the thought that makes  
 most sense is  
 The one you're apt to hear  
 the least:  
 "Why not try cutting ex-  
 penses?"  
 —George O. Ludcke.

**Candid Comment**  
 When the inserts become  
 more interesting than the  
 magazine, the editor should  
 worry.  
 —Bert H. Kruse.



"Dad, may I have an expense account instead of an allowance?"

Tint Tainted  
My cheeks are sunk, I'm in a  
funk,  
My eyes could not be duller—

I watched a film I used to  
love  
And found they've added  
color!

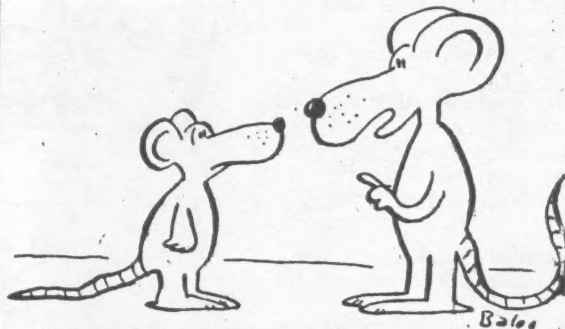
—Dick Emmons.

#### Foot Note

In my school days, students  
whose parents couldn't afford  
to buy shoes wore sneakers to  
school. Today, students  
whose parents can't afford to  
buy sneakers wear shoes to  
school.

—Harvey Gittler.

THE WALL STREET JOURNAL



"... and stay away from scientists—they  
cause cancer."

## Pepper . . . and Salt

### Unwelcome Returns

The calculus, algebra and  
trig,  
With which I once kicked up  
a storm,  
Are now gradually coming  
back—  
Thanks to the simplified tax  
form.

—Joshua Adams.

### Daffynition

Censor: tskmaster.

—Len Elliott.

THE WALL STREET JOURNAL



## Pepper . . . and Salt

### Jiggernaut

I'm always stymied when I  
try  
To think of something  
clever  
When I ask guests  
What they'll have to drink,  
And the answer is "what-  
ever."

—E.B. de Vito.

### Scared Speechless

I'd rather be drawn and  
quartered  
In a manner inhuman  
Than split an infinitive  
Near Edwin Newman.

—Mae Woods Bell.

### Daffynition

Perennial flower: bloo-  
merang.

—John Dromey.

THE WALL STREET JOURNAL



"Just think, Son—in a few years we'll be able  
to blame you for the deficit."



## Pepper . . . and Salt

THE WALL STREET JOURNAL

### Mixed Benefits?

Those touting a laid-back life style

Find it's not all sheer enjoyment,

For while lengthening their life spans,

It shortens their terms of employment.

—Edward F. Dempsey.

### Exclusive Exiles

If there's no rest for the wicked,

Not even on lumpy cots,

Why do the deposed dictators

Show up at the resort spots?

—Bud Stiller.

### Cold Truth

If winter comes, as Shelley asks,

Can spring be far behind?

As luck would have it, where I live,

The answer's yes, I find!

—Dick Emmons.



"That's just the way it is. You can be not guilty by reason of insanity, but you cannot be not guilty by reason of stupidity."

## Pepper . . . and Salt

THE WALL STREET JOURNAL

### Day of Wreckoning

("Trial Lawyers Adopt a Code of Conduct for Disaster Scenes"—WSJ headline)

The lawyers' code of conduct

Has at last been signed and sealed,

But it goes without saying That it's bound to be appealed.

—Arnold J. Zarett.

### Candid Comment

Perhaps taxation without representation was tyranny, but it was a heck of a lot cheaper.

—Arnold Glasow.



"It's nice that you've been born again, Mr. Bemis, but that doesn't mean you can take an additional dependent."